



## United States Patent Application For

### EXPANSION MOTOR

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What is claimed is:

1. An external expandable holding device comprising;
  - a) first member having a external surface;
  - b) a resilient expansion sleeve secured flexurally to the first member for receiving the aperture of a second member;
  - c) a filister along the expansion area to further relieve stress;
  - d) an expansion chamber with an external leading channel is defined between the first member and the expansion sleeve for receiving fluid;
  - e) wherein fluid is by means pumped to pressurize expansion chamber thereby the expansion sleeve is deformed to engage the second member;
  - f) whereby upon release of the pressure the expansion sleeve returns to the relaxed condition to release the second member.
2. The expandable device according to claim 1 wherein the holder and the expansion sleeve are cylindrical and the expansion sleeve expands radially outwardly to engage the second member.
3. The expandable device according to claim 2 whereby the fluid is a liquid.
4. The expandable device according to claim 2 whereby the fluid is a gas.
5. The expandable device according to claim 2 whereby the external surface of the resilient expansion sleeve has special holding features.
6. The expandable device according to claim 2 whereby the holder is a shaft, a mandrel, an arbor, a clutch, a friction brake, a coupling, a damper, or a workholder and the second part is a tool, a workpiece, a hub, or a part.
7. The expandable device according to claim 2 whereby the holder is a molded piece.
8. The expandable device according to claim 2 wherein the expansion chamber is an annular expansion chamber extending around the circumference of the holder.

9. The expandable device according to claim 8 whereby the holding device comprises of a plurality of expansion chambers arrayed longitudinally.
10. The expandable device according to claim 2 wherein the expansion chamber extends around a portion of the circumference of the holder.
11. The expandable device according to claim 2 whereby the holding device comprises of a plurality of expansion chambers that are axial arrayed radially.
12. The expandable device according to claim 11 whereby the holding device comprises of a plurality of expansion chambers arrayed longitudinally:
13. An internal expandable holding device comprising;
  - a) a first member having a bore for receiving a second member;
  - b) a cover to the secured to the first member;
  - c) an expansion chamber with rounded corners to eliminate stress concentration extends to a thin wall as defined by the bore is defined within the first member between the cover;
  - d) the expansion chamber is joined by a channel to an aperture;
  - e) furthermore to reduce stress concentrations the bore surface has filsters along the thin wall;
  - f) wherein fluid is by means pumped to pressurize expansion chamber thereby the first member is deformed to exert force to the second member;
  - g) whereby upon release of the pressure the first member returns to the relaxed condition to remove the force from the second member.
14. The expandable device according to claim 13 wherein the holder and the expansion sleeve are cylindrical and the expansion sleeve expands radially inward to engage the second member.
15. The expandable device according to claim 14 whereby the fluid is a liquid.
16. The expandable device according to claim 14 whereby the fluid is a gas.
17. The expandable device according to claim 14 whereby the external surface of the resilient expansion sleeve has special holding features.

18. The expandable device according to claim 14 whereby the holder is a collet, a hub, a journal, a coupling, a clutch, a friction brake, or a workholder and the second part is a tool, a workpiece, a shaft, or a part.
19. The expandable device according to claim 14 whereby the holder is a molded piece.
20. The expandable device according to claim 14 wherein the expansion chamber is an annular expansion chamber extending around the holder.
21. The expandable device according to claim 14 wherein the expansion chamber is an annular expansion chamber extending partially around the holder.
22. The expandable device according to claim 20 whereby the holding device comprises of a plurality of expansion chambers arrayed longitudinally.
23. The expandable device according to claim 20 wherein the expansion chamber extends around a portion of the bore of the holder.
24. The expandable device according to claim 23 whereby the holding device comprises of a plurality of expansion chambers arrayed polar radially.
25. The expandable device according to claim 12 whereby the holding device comprises of a plurality of expansion chambers arrayed longitudinally.
26. An external expandable lineal actuating device comprising;
  - e) first member having a external surface;
  - f) a cover is secured to the first member;
  - g) an expansion chamber with rounded corners to eliminate stress concentration extending to a thin wall is defined within the first member between the cover;
  - h) wherein expansion chamber is joined by a channel to an aperture;
  - i) furthermore to reduce stress concentrations externally the thin wall is bordered with filsters;
  - j) wherein fluid is by means pumped to pressurize expansion chamber thereby the first member is deformed to exert force to the second member;
  - k) whereby upon release of the pressure the first member returns to the relaxed condition to remove the force from the second member.
27. The expandable device according to claim 26 wherein the first member is a disc and the surface of the thin wall expands engage the second member.
28. The expandable device according to claim 27 whereby the fluid is a liquid.

29. The expandable device according to claim 27 whereby the fluid is a gas.
30. The expandable device according to claim 27 whereby the external surface of the resilient expansion sleeve has special holding features.
31. The expandable device according to claim 27 whereby the disc is a clamp, a support, a damper, a friction brake, a friction clutch, a jack or a workholder and the second part is a tool, a workpiece, or a part.
32. The expandable device according to claim 27 whereby the holder is a molded piece.